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ON MONOBROMATED CAMPHOR.

By John M. Maisch.

Monobromated camphor was discovered by Th. Swarts in 1861,* who obtained it by heating Laurent's bibromide of camphor ($C_{20}H_{16}O_2Br_2$), in a sealed tube, to 100° C. After several hours, the color of bromine disappears, hydrobromic acid is formed, and a brownish oil, which gradually becomes crystalline, and contains the new compound. If bromine and camphor, in the proper proportions, are heated, in a sealed tube, for three hours, in the water-bath, the same compounds are formed. The crystalline mass is washed with water, recrystallized from alcohol after treatment with animal charcoal, washed with an alcoholic solution of potassa, to free it from hydrobromic acid, then with much water, and finally recrystallized from a mixture of alcohol and ether.

After the publication of Professor Deneffe's account† of the medicinal properties of this compound, I attempted to prepare it, at the request of Professor Wm. A. Hammond, of New York, and followed at first the above process, not being aware at the time of the subsequent researches of W. H. Perkin, to which I shall presently refer.

Laurent prepared bibromide of camphor by dissolving camphor in cold bromine, and freeing the crystals, which form after some time, by rapid expression between bibulous paper. Gerhard states that these crystals decompose on the application of heat into bromine and

* L'Institut, 1862–63. Kopp & Will's Jahresbericht, 1862, 462.

† Amer. Journal of Pharmacy, 1872, 84.

camphor, which, however, has been refuted by Perkin. I can confirm this observation of the latter, and have also satisfied myself that Laurent's statement, that camphor crystallizes unaltered from its warm solution in bromine, is incorrect, as the copious evolution of hydrobromic acid already proves.

Monobromated camphor is formed according to the following equation: $C_{20}H_{16}O_2+2Br=C_{20}H_{15}BrO_2+HBr$. If prepared in a closed tube, it is evident that at all stages of the process the pressure must be very considerable, at first in consequence of the volatile nature of both camphor and bromine, and subsequently on account of the presence of the gaseous hydrobromic acid. When operating on a small scale, with suitable precautions, there was little difficulty in obtaining the compound. But when using several ounces of bromine at once, the tubes were usually shattered, and it became evident that this process could not be used with advantage on a large scale. The observation that on slightly heating the mixed camphor and bromine, the heat increases after the withdrawal of the fire, and the vessel contains considerable quantities of hydrobromic acid, suggested the idea that the camphor might be bromated without using closed tubes, simply by digesting the bibromide at an elevated temperature, or by allowing bromine to act upon camphor at a higher temperature, with the precaution to return into the retort any bromine and bromide of camphor which might be volatilized, while the disengaged hydrobromic acid might be absorbed by a solution of an alkali.

The neck of the retort was raised and connected with a reversed Liebig's condenser, which being found unnecessary, was afterwards substituted by a glass tube. If the reaction was not allowed to become too violent in the beginning, no bromine volatilized, but a yellowish-brown substance condensed in the neck, flowing back into the retort, like oil; gradually this became lighter in color, and golden-yellow needles were observed in the upper part and neck of the retort after cooling. Whether these needles are a bromide of camphor or a hydrobromate of monobromated camphor, has not been determined.

The heat was raised after the first reaction was over to a temperature varying in the different experiments between 100° and 132° C. (212 and 270° F.) The higher temperatures were found better adapted for rapidly generating the monobromated camphor; but in all cases a considerable quantity of an oily compound was found in the mother liquor from which the monobromated camphor had crys-

tallized. This oil contained more or less of the latter compound in solution, which was obtained by reducing it to a low temperature. The mother liquors containing the oil, in consequence of the frequent application of heat, turned black and left after the evaporation of the menstruum a black oil, which in the course of several weeks became granular; the oil still present in the magma could not be removed by different solvents which would also dissolve the crystallized granules. On being expressed between bibulous paper a grey solid mass was left behind, which was permanent in a temperature of 32° C. (90° F.), but became soft and oily when exposed to the direct heat of the sun, which was above 38° C. (100° F.) This compound is not monobromated camphor; its composition has not yet been investigated.

Attempts to separate the whole of the monobromated camphor from this oily substance by sublimation were not successful; the whole mass, after a slight white sublimate had been obtained, near 132° C. (270° F.), turned black, and after cooling sometimes did not separate any crystals, but remained liquid and oily, while at other times dark blackish-grey crystals were obtained.

It was noticed that the mother liquors of the first crystallizations of monobromated camphor contained considerable hydrobromic acid, which also adhered to the crystals. The endeavor to remove it by washing with hot water was not entirely successful, and necessitated the drying of the solid portion previous to recrystallization from alcoholic solvents. To avoid these difficulties the removal of the acid by means of a weak alkali (carbonate of lime) suggested itself, and, instead of alcohol, petroleum benzine was experimented with as a suitable menstruum for recrystallization.

The first crystallizations, whether obtained from alcohol or from petroleum benzine, contained notable quantities of the oily matter mentioned above, in consequence of which bromine was liberated on exposure to the light. The greatest portion of this oil could be removed by pressure between bibulous paper, and the remainder by subsequent recrystallization; but the loss of monobromated camphor was considerable, owing to its being partly absorbed by the paper with the oil, and to remain to some extent in the mother liquor with that portion of the oil not absorbed by the paper. Gasoline or petroleum naphtha was found to be a good solvent for this oil, and to dissolve at the same time much less of the monobromated camphor than alcohol, ether or petroleum benzine. Accordingly, when the

crystals as first formed have been drained in a funnel, they may be obtained nearly pure simply by washing them with gasoline, and require then one crystallization from alcohol or petroleum benzine, to be entirely pure and unaltered in the light. The monobromated camphor dissolved by the gasoline, may be recovered by evaporating most of the solvent spontaneously, washing the crystals with a little gasoline and recrystallizing. The remaining mother liquors, if not used as solvents in subsequent operations, may be worked up with the oil left by the first crystallization.

While experimenting with bromide of camphor, W. H. Perkin,* in 1865, obtained monobromated camphor by treating the oily matter obtained from the action of bromine and camphor with hot solution of potassa, and subsequently heating the product in a retort, collecting that portion of the distillate separately, which comes over above 364° C. (508° F.)

Th. Swarts,† however, prefers the process suggested by him to that of Perkin, regarding the former as more satisfactory; he also states that when moist monobromated camphor is distilled, or it is left in contact with hot water, bromine and hydrobromic acid are evolved, and camphor free from bromine is separated. The regeneration of camphor under these circumstances has never been observed by me; on the contrary, when the monobromated compound is boiled in a retort with water, a white crystalline sublimate resembling snow-flakes is slowly formed in the neck of the retort, and these crystals contain bromine, and have all the behavior of monobromated camphor.

Perkin observed that monobromated camphor, treated with alcoholic ammonia in a sealed tube, at 180° C. (356° F.), undergoes a slight decomposition, with the formation of an organic base and of ammonium-bromide. Fearing that the prolonged action of hot potassa solution upon the oil which already contains monobromated camphor might induce its decomposition, and my time not permitting to investigate it, I had resort to carbonate of lime (white marble), which, as previously observed, was found to answer the purpose well, as far as the removal of hydrobromic acid was concerned. On heating the remaining oily matter gradually, it was found to turn black when nearing 150° C. (300° F.), the color became darker as the tem-

* Journal of the Chemical Society, new series, iii, 92; Annalen d. Chem. u. Pharm. Suppl. iv, 124, and Will's Jahresbericht, 1865, 570.

† L'Institut, 1866, 287. Will's Jahresbericht, 1866, 622.

perature rose, and a little oil distilled over, which solidified after a while and turned red from the liberation of some bromine. Meanwhile the flake-like sublimate in the neck of the retort increased considerably, and the hot liquid boiled actively between 260 and 261° C. (500 and 502° F.), disengaging considerable quantities of hydrobromic acid, and separating also so much charcoal that the retort cracked. 8 ounces of bromine had been used in this experiment, the black residue of which, when dissolved in alcohol and filtered, yielded white crystals, requiring to be recrystallized once, while the mother liquor had a strong acid reaction, due to free hydrobromic acid.

Although this experiment was not very favorable for Perkin's process, in its application to the preparation of this compound on a large scale, it suggested a method of utilizing the oily residue which had accumulated from the mother liquors of the first crystallization of monobromated camphor prepared at a lower temperature. The grey granular mass, left by expressing a portion of the solidified oil, as stated above, was slowly heated to 260° C. (500° F.), and after the disengagement of most of the hydrobromic acid, was dissolved in petroleum benzine, treated with marble and filtered, when monobromated camphor crystallized. The oily residue, containing some of the granular compound, was next treated in the same way, with a similar result. In both cases some of the oily mass was left in the mother liquor, which may undoubtedly be utilized in a subsequent operation.

To recapitulate the results of these experiments, before giving the process which in my experience is best adapted to obtain monobromated camphor on a more extensive scale for medicinal purposes, it may be stated that the process is divided into three distinct operations: 1, the combination of bromine with camphor (bibromide of camphor), which takes place at the ordinary or slightly elevated temperature, particularly in the presence of a trace of alcohol; 2, the formation of the substitution compound (monobromated camphor), which may be effected at a temperature of 100° C. (212° F.), or in a much shorter time at 132° C. (270° F.); and 3, the utilization of the oily residue, the greatest part of which is converted into the substitution compound at 260° C. (500° F.) The product of the second part is at once white, requiring, if decomposition has been avoided, no filtration, but simply recrystallization. The use of the cheap petroleum benzine and naphtha, in preference to alcohol and ether, will also commend itself for the sake of economy. The yield is probably

larger than by Perkin's process, and the entire absence of all danger by the bursting of apparatus recommends this method as more practical than that of Swarts. Although more time is required for finishing the process completely, the different reactions will not require much supervision, except the careful attention to the temperatures.

The combining weight of camphor $C_{20}\,H_{16}\,O_2$ is 152; that of 2 Br =160; equal weights of the two substances, therefore, give a slight excess of camphor. I have found it advisable to use about one-twelfth more of camphor, the excess of which remains in the mother liquor, and very likely serves to prevent the formation of bibromated camphor ($C_{20}\,H_{14}\,Br_2\,O_2$,) if the oily residue previous to its final treatment has liberated bromine on exposure to the light. A greater increase of camphor is unnecessary, since even in the proportion of two to one bromine, the formation of the oily compound and the liberation of bromine on subsequent exposure is not prevented, while the difficulty to obtain the substitution compound free from camphor is considerably increased.

In regard to the quantity that may be conveniently worked up at a time, the manipulation described below renders it possible to use 12 oz. of bromine in a retort of the capacity of a quart, in which even 14 oz. have been operated upon by me at once.

Regarding the necessary apparatus, I have found the following most serviceable, and well adapted for the purpose.

A quart retort is placed in such a position that, the neck being sufficiently raised, any liquid condensing therein may readily flow back into the retort. To the neck is joined a glass tube, eighteen inches to two feet in length, bent downwards at the farther end, and by means of India rubber and glass tubing connected with a bottle of about 8 oz. or more capacity; the glass tube is cut off immediately beneath the cork, while another glass tube, running nearly to the bottom of the bottle, is bent twice at right angles, and dips with the other end into an open bottle containing about 8 oz. of water and an alkali for the absorption of the hydrobromic acid. The intervenient bottle, which is empty, serves merely as a receptacle for the bromide solution, which is drawn over on the cooling of the contents of the retort, and pressed back again into the last bottle on the reapplication of heat; the liquid is thereby prevented from running into the retort, but the bottle may be replaced by a Welter's safety-tube inserted into the tubulure. Since, theoretically, one half of the bromine employed is

converted into hydrobromic acid, its saving is a matter of some importance; it may be collected in water, or combined with any salifiable base or its carbonate. I have found the employment of white marble very convenient; the resulting solution of bromide of calcium is nearly pure; traces of iron present are removed by hydrosulphate of ammonia, after which the solution will, on evaporation, yield the pure salt.

The retort is charged with 13 oz. of camphor broken into pieces of convenient size, with which the neck is completely filled, while the balance is given into the retort. For this quantity, 12 oz. of bromine are used, which is introduced in four or five portions in quantities ranging from 2 to 4 oz. at a time, the larger quantity being used in the beginning, the smaller afterwards. If a funnel tube is used for this purpose, and the last drops of the bromine are washed down with a small quantity of alcohol, (about ½ drachm,) the reaction usually commences in from 15 to 20 minutes, or it may be brought on by the careful application of heat, which should be at once withdrawn as soon as gas bubbles commence to rise in the retort; the reaction will then proceed without any further attention, the heat increases, some bromine and bromine compounds volatilize, the latter being mostly condensed in the upper part of the retort, while the former condenses in the neck, forming with the camphor an oily liquid which returns to the retort. The next addition of the bromine should not be made until the contents of the retort have cooled down almost or quite to the ordinary temperature; and this precaution should particularly be observed, if, perhaps in consequence of too violent reaction, all the camphor has run into the retort. The contents of the latter will usually solidify when cooling, after such a reaction; but sometimes they remain quite fluid, and congeal on the subsequent addition of the requisite bromine. If the bromine is added in too large quantities, the heat will become so high, and the reaction so violent, that a large quantity of bromine may distil over uncondensed; if added in fractions, with the precautions stated, the temperature rises generally to from 60 to 65° C., (140 to 150° F.,) with at first slow, but gradually brisk extrication of hydrobromic acid gas. It follows from the latter phenomenon, that the mass must contain some monobromated camphor, or perhaps combinations of it with hydrobromic acid and bromine.

Up to this stage the tubulure of the retort may be kept closed with

the glass stopper; now a thermometer is inserted, and the retort slowly heated; a rapid, but regular evolution of hydrobromic acid gas takes place as the temperature increases; the golden yellow needles, mostly condensed in the neck, fuse and run back, and when the temperature has gradually reached about 120° C., (248° F.,) the liquid boils somewhat and the evolution of gas slackens. From and above 90° C., (194° F.,) the deep red color of the liquid becomes much lighter, and if the heat is raised to about 132° C., (270° F.,) the color will not deepen. At a somewhat higher temperature, particularly when nearing 150° C., (302° F.,) the liquid soon becomes darker and finally black.

When the temperature has reached 132° C.—which should require not less than three hours—the fire is withdrawn and the retort allowed to cool to about 50 or 55° C., (120 to 130° F.); the contents are dissolved in 12 oz. of petroleum benzine, and the solution is poured into a beaker glass containing some warm water and pieces of marble to neutralize the free acid still present. While cooling, the benzine solution is occasionally stirred to disturb the crystallization. On the following morning, the liquid matter is poured off, the benzine mother-liquor separated from the aqueous solution of bromide of calcium, and the crystals drained upon a funnel, the neck of which is loosely stopped with some cotton. Petroleum naphtha or gasoline is poured upon them until they change but little in color when exposed to the direct sunlight. When dry the crystals will weigh about twelve ounces; for complete purification they require to be recrystallized from alcohol or petroleum benzine.

More crystals may be obtained by evaporating the benzine mother-liquor to one-half and washing them first with the naphtha solution and then with some fresh naphtha. The mother-liquor, not yielding sufficiently pure crystals, is evaporated, heated in a retort to 260° C., (500° F.,) when it boils again, evolving hydrobromic acid. When the evolution of the latter slackens, the black mass, after cooling sufficiently, is taken up with benzine, the solution treated, as before, with warm water and an alkali (marble) and set aside to crystallize; the black crystals are redissolved in alcohol or benzine, the solution filtered and crystallized. The crystals require to be washed with petroleum naphtha, and on recrystallization are obtained pure. The remaining mother-liquors which on concentration do not yield any crystals, are evaporated, and the oily matter reserved for a subsequent operation.

Monobromated camphor crystallizes from alcohol in thin white or colorless prisms or needles; from petroleum benzine, it may be obtained in long, flat prisms, which are perfectly transparent and hard, and assume the appearance of shining scales when crystallizing rapidly from a very concentrated solution. It is entirely insoluble in water, but readily and freely soluble in alcohol, ether, and in less than its own weight in hot petroleum benzine, from which solution the greater portion crystallizes on cooling. It is permanent in the air and is not affected by the direct sunlight. Boiled with water it evaporates very slowly, condensing in the neck of the retort in fine white interlaced needles. Its odor is somewhat camphoraceous, not very strong, but persistent, and reminding of Borneo camphor; the taste likewise reminds of camphor, and is terebinthinate and scarcely bitter. It fuses at about 67° C., (170° F.,) and boils with partial decomposition at 274° C., (525° F.) According to Swarts, it forms with hydrochloric and hydrobromic acids, oily compounds, crystallizing after having been warmed for some time, in soft scales. This is very probably the oil-like matter remaining in the first mother-liquor, and requiring for its decomposition a temperature of 260° C., (500° F.) But even then the decomposition is not complete, and Perkin found that the product obtained by his process at 274° C., required to be freed from oil by pressing between bibulous paper. Long continued application of heat, (260° C.,) and treatment with potassa may perhaps effect it. Its decomposition by the action of light and air may probably be expressed thus: $C_{20}H_{15}BrO_2$, $HBr = 2Br + C_{20}H_{16}O_2$.

When boiled with a solution of nitrate of silver in nitric acid, monobromated camphor is decomposed and bromide of silver precipitated. From this the amount of bromine was calculated, and the following results obtained.

	THEORY.		FOUND.		
			I.	II.	III.
20 C	120	51.95	—	—	—
15 H	15	6.49	—	—	—
Br	80	34.63	34.59	34.57	34.64
2 O	16	6.93	—	—	—
	231	100.00			

No. I was monobromated camphor crystalized from petroleum ben-

zine; II, crystallized from alcohol, and, III, obtained by heating the oily compound of the first mother-liquor to 260° C. and crystallizing from petroleum benzine.

NOTES ON PEPSIN, BISMUTH, AND ELIXIR OF PEPSIN AND BISMUTH.

By E. Scheffer.

Several facts which I published in my essay (*Am. Jour. Phar., Feb.*, 1872), impressed on me the impossibility of a preparation such as elixir pepsin, bismuth, (and strychnine.) I do not want to speak again about the presence of alcohol in a solution containing pepsin, as I have repeatedly given the results of my experiments, which prove beyond doubt that pepsin and alcohol, particularly when the latter amounts to a certain percentage, are incompatible.

The main objection I intended to bring against such an elixir, prepared with ammonio-citrate of bismuth in a neutral or alkaline solution, is the neutral or slightly alkaline state. My experiments prove clearly that pepsin, in neutral solution, does not keep, and that in alkaline solution it loses its digestive properties. In how minute quantities the presence of an alkali destroys the digestive properties of pepsin, will be shown by the following experiments, quite recently made.

Having once taken, instead of distilled water, of our well water—which contains carbonate of lime and magnesia—to swell the pepsin, before the acid was added, I was astonished to find that the pepsin did not act on albumen. This caused me to repeat the experiment simultaneously with others for control.

A. Pepsin swelled in distilled water; the acid (6 drops of muriatic acid to the fluid ounce) added afterwards.

B. Pepsin swelled in well-water, and 6 drops of acid added to 1 oz. after 2 hours.

C. Pepsin swelled in distilled water, which was before shaken with carbonate of magnesia, for two days, and then filtered; 6 drops of acid added after two hours.

D. Pepsin dissolved in acidulated well water.

Of these four experiments each contained the same amount of acid, the same amount of pepsin, and to each vial the same amount of coagulated albumen was given. After having been exposed to a temperature of 105° Fahr. for six hours, in A and D all the albumen

was dissolved, while in B and C the albumen did not appear to have been acted upon.

Therefore, in C, the small quantity of magnesia which the distilled water had dissolved, and with which quantity the pepsin had been in contact before the acid was added, was sufficient to modify the pepsin and destroy its digestive action on fresh coagulated albumen. In B, the carbonates of the well water had caused the same result. In D, the carbonates were destroyed by the addition of acid before the pepsin was added, and therefore the albumen was easily dissolved. Such proofs, I think, must necessarily convince the most skeptic.

The physician might wish for a combination of pepsin and bismuth in the liquid state, but another question is, can such a combination be made, or can it exist? Those that manufactured the elixir of pepsin and bismuth (and strychnine), were satisfied to know that they used pepsin in its preparation, but whether it was in it or in an active form, never troubled them, as they never tested for it. They could conscientiously put their label on the bottle, and maintain that they used pepsin in its preparation. The physician prescribed it in good faith, because he had confidence in the firm who made it, and in the name by which the preparation was designated.

Having tested several elixirs of pepsin and bismuth that I could get hold of, I found that even after the addition of hydrochloric acid not the least quantity of albumen was dissolved.

Thinking that an acidulated bismuth solution might, in combination with pepsin, prove more efficacious containing the pepsin in its active form, my first aim was to find a bismuth salt for that purpose.

Crystallized ternitrate of bismuth dissolves in glycerin, which solution can be diluted with a considerable quantity of water before the subnitrate is precipitated. This salt I dropped from the list, as the solution is too acid and tastes too styptic.

Freshly precipitated subnitrate of bismuth, prepared with 1 part of crystallized ternitrate with 40 parts of water was put on a filter, and when entirely drained added to glycerin, in which it dissolves, forming a clear solution, but on the addition of water the clear solution becomes milky after some time.

I now tried the action of acids on ammonio-citrate of bismuth. For that purpose I made two solutions of ammonio-citrate of bismuth of the same strength, with the difference that the one solution was made with water alone, and the other with a mixture of glycerin and

water. To these solutions were now added different acids, and the following results obtained: Mineral acids gave in both solutions immediately a precipitate. By the addition of organic acids, such as acetic, lactic and citric, both solutions kept clear, but after a lapse of several hours the pure water solutions became milky, and by longer standing deposited a white precipitate, while in the solutions containing glycerin, an opalescence did not show itself before 24 hours.

Judging that a small quantity of organic acid, sufficient to dissolve the pepsin, would not give even an opalescence in a solution of ammonio-citrate of bismuth containing glycerin, I thought that a glycerole could be made containing pepsin as well as bismuth, etc.; but by mixing the pepsin solution with the solution of the bismuth salt, the pepsin was precipitated in the same characteristic form as it is precipitated from its solutions by chloride of sodium.

Having at first intended to make the glycerole contain in the pint 128 grains ammonio-citrate of bismuth, 256 grains of saccharated pepsin (respectively 1 and 2 grains to the fluid-drachm), 1 fluid-drachm of lactic acid, 8 fluid-ounces glycerin, and 8 ounces of water, I thought that by making it only half as strong in bismuth and pepsin it might answer, but the pepsin was in this instance also precipitated. The ingredients were put together in four different ways, but in all with the same result.

This negative result proves clearly that the pepsin is precipitated from its solution by the bismuth salt, and as I have proven in my essay (Feb., 1872), that a watery solution of pepsin is precipitated by chloride of sodium in the same way as an acidulated one, we must infer that the bismuth salt acts the same, and that therefore the elixir of pepsin and bismuth, as it was made, *cannot contain any pepsin.*

Abstracting, therefore, from the alcohol, and not speaking of the neutral or alkaline solution, the elixir of pepsin and bismuth is an incongruity, and when patients have derived any benefit from it, it was from the bismuth it contains and the stimulating effect of the spirits, but surely not from the pepsin, *as it does not contain any pepsin.*

Louisville, Ky., July 1st, 1872.

GLYCEROLE OF ASSAFŒTIDA.

By Alonzo Robbins.

℞.	Assafœtida, ...	℥ij.
	Glycerin, q. s., ft., ...	f. ℥viii.

Select the best assafœtida and cut it quite fine; put it into an

eight-ounce bottle, and add five fluid-ounces of glycerin; cork well and suspend in a can of water, which place on the stove where the heat will be very moderate; leave it remain so a day or two, shaking the bottle frequently; then strain through a coarse cloth, and return the residue to the bottle with three fluid-ounces of glycerin; let stand as before, and then strain into that first obtained, and make up to 8 fluid-ounces by adding glycerin.

One fluid-drachm of this added to seven drachms of water will make milk of assafœtida containing the proper quantity of the drug.

The formula, as given above, I have made use of a number of times during the last ten years, and have found it to furnish at all times a good article of milk of assafœtida. I have also used glycerin with gum ammoniac, and while the solution was not as perfect as that of assafœtida, I have found, upon examination, that the amount of ammoniac taken up is about the same as when the mistura ammoniaci is made by the officinal formula. With myrrh I did not succeed well, but still obtained a passable preparation which I have no doubt could be, by continued experiment, much improved.

ON SOME CONSTITUENTS OF THE RHIZOME OF SANGUINARIA CANADENSIS.

By Ernest Peirpoint.

From an Inaugural Essay.

The author reviews the various chemical examinations by Dana, Schiel, Riegel, Wayne, Gibb and Newbold, and then relates his observations.

In preparing sanguinarina, the powdered root was digested in water strongly acidulated with muriatic acid, the liquid expressed, filtered and precipitated with aqua ammoniæ in excess. The precipitate, which was of a brownish-purple color, was collected on a filter. The paper on which the precipitate was deposited was torn into small pieces, and digested with alcohol till it would take up no more of the substance. The object of digesting with alcohol instead of at once treating with ether, is to save ether, which is absorbed by the paper and magma. The alcoholic solution was then evaporated to dryness, and a small quantity of ammonia was added (to neutralize any acid absorbed from fumes), which changed it from a deep blood-red to a light fawn color. This residue was then repeatedly shaken with ether, till a small portion of the solvent evaporated on platinum foil left no residue, and

was not reddened by dilute sulphuric acid. During the agitation of the residue with ether, there was noticed a marked fluorescence, similar to that of acid solutions of quinia, which was also observed in alcoholic solutions, but not to the same degree as in the former. Having never read of this, I thought it worthy of mention. The ethereal solutions were then mixed, and precipitated with a mixture of sulphuric acid and ether. The precipitate was dissolved in hot alcohol, and left to evaporate spontaneously.

The clear filtrate obtained after precipitating the sanguinarina by ammonia was acidulated and tested for an alkaloid by iodohydrargyrate of potassium, which caused a light brown precipitate. This was collected on a filter and washed well with water. The filter was then torn up as before, and digested in a concentrated solution of carbonate of soda for 24 hours, and finally evaporated to dryness. The residue was treated with alcohol (sp. gr. ·835) till it would take up no more. The alcoholic solution was then evaporated to dryness.

Supposing that the alkaloid, which had caused the precipitate with the iodohydrargyrate, might be a small quantity of sanguinarina dissolved by the excess of ammonia employed, some of the acidulated watery infusion was precipitated by ammonia, leaving it in excess. The liquid was allowed to stand for a day in the test tube, and then filtered. A small portion evaporated on platinum foil left a slight residue, but was not reddened by dilute sulphuric acid. When the dilute acid was added in excess to the liquid in the test tube, it gave no red color, as would result with a solution of sanguinarina. After evaporating the alcoholic solution the residue was placed in a flask, and agitated with ether to remove any sanguinarina that might be present. When the ethereal liquid was evaporated on platinum foil, it left no residue.

The mass which was not taken up by ether was shaken with very dilute sulphuric acid, and treated with animal charcoal. On evaporation, fine needle-shaped crystals formed, and when a small crystal was exposed to heat on a platinum foil, it swelled up, blackened and burned, leaving only a slight residue; this, when boiled with water and filtered, gave a white precipitate with oxalate of ammonia and chloride of barium, indicating a little sulphate of lime, probably derived from the animal charcoal.

The mass of crystals thus obtained were exhausted with alcohol and the alcoholic solution evaporated, when the same needle-shaped

crystals were obtained. They were clear, almost transparent, and had an acrid and slightly pungent taste. When exposed to heat they swelled up, blackened, and were entirely volatilized.

From the small quantity obtained I was unable to present a specimen or to make any further experiments, but hope to do so at some future time.

To obtain puccin, the clear ethereal solution left on precipitating the sulphate of sanguinarina was set aside; on standing, a deposit took place on the sides of the bottle, consisting of sulphate of sanguinarina, known by its red color.

The clear ethereal liquid was then poured into a retort, carefully separating the free acid at the bottom of the bottle. It was then slowly distilled till nearly dry, leaving a slight residue of a brownish-red color and having the odor of sulphate of sanguinarina.

It was not rendered turbid by the addition of a larger quantity of ether.

The retort was then rinsed out with ether and the whole evaporated to dryness, when it was obtained in the state of a reddish-brown mass, having taste, smell and all the external characteristics of sulphate of sanguinarina, which might have been re-dissolved in the excess of ether employed for its precipitation.

Equal bulks of sulphate of sanguinarina and this residue were taken and separately treated with equal quantities of ether; the residue was dissolved, while the sulphate of sanguinarina was not.

The residue had an acid reaction to test paper; it was then dissolved in alcohol and left to evaporate spontaneously.

For want of time I did not make any further experiments with sanguinarina and puccina, which appear to be not identical, as has been asserted by some.

Sanguinarinic acid was prepared from the filtrate after precipitating by iodohydrargyrate of potassium. The precipitate obtained with solution of acetate of lead was washed with water to remove excess of lead; the moist magma was suspended in water, and sulphuretted hydrogen was passed through it till the black sulphide of lead was no longer produced. The clear filtrate, free from lead, was evaporated till it formed into a crystalline mass of a deep red color. The crystals were insoluble in alcohol, and their taste was sour and acrid.*

* Newbold's sanguinarinic acid is soluble in alcohol, and has little taste. (See Amer. Journal of Pharmacy, 1866, 497.)—Ed.

The residue left after exhausting the precipitate by ammonia with ether, was treated with dilute sulphuric acid and purified by animal charcoal. The filtrate, on evaporation, yielded crystals containing sulphate of lime, which were exhausted with alcohol. This solution produced crystals of the same appearance as obtained in the precipitate by the iodohydrargyrate, and the two are probably identical. Their nature has not been ascertained, except that they are the salt of an alkaloid.*

GLEANINGS FROM THE EUROPEAN JOURNALS.

By the Editor.

Generation of Hydrocyanic Acid from Nitro-Compounds.—Wöhler observed in 1828, that picric acid, on being treated with baryta water, yields hydrocyanic acid. Julius Post and H. Hübner observed that nitro- and dinitrobenzol yield the same acid when treated with caustic alkalies, the former with fusing potassa, the latter with boiling dilute solutions of potassa. The authors intend to investigate other nitro- and amido-compounds.—*Ber. d. d. Cem. Geo. zu Berlin*, 1872, *N.* 9.

Estimation of Uric Acid.—H. Schwanert has found that uric acid whether precipitated by muriatic acid from its soda solution, from the urine of healthy or of leucæmic persons, remains partly in solution, so that for every 100 c.c. of liquid 0·0048 gram. must be added to the weight of the precipitate, corroborating the researches of Zabelin.† The proposed method of Solkowski,‡ to precipitate first with muriatic acid, and after supersaturation with ammonia, by nitrate of silver, decomposing by sulphuretted hydrogen, and precipitating by muriatic acid, may sometimes occasion a loss of uric acid.—*Ibid.*, No. 7.

Estimation of the Commercial Value of Carbolic Acid.—To ascertain the amount of pure carbolic acid, Schædler converts it into sulpho-carbolic acid, operating as follows: 2 or 3 grammes of the acid are heated in the waterbath to expel alcohol, if present; an equal quantity of sulphuric acid is added, and the mixture digested between 50 and 60° C., (122 and 140° F.,) afterwards diluted and saturated

* This alkaloid, if not identical with, seems at least to bear some resemblance to, chelidonina, which has an acrid taste, dissolves in alcohol and in ether on prolonged boiling, and yields salts having a bitter taste.—Ed. Am. Jour. Pharm.

† Annalen d. Chem. u. Pharm. Suppl. ii, 313.

‡ Virchow's Archiv. lii, 60.

with carbonate of baryta or litharge; the filtrate is precipitated by dilute sulphuric acid, the precipitate washed, dried and heated, and its weight calculated into that of pure carbolic acid.—*Pharmac. Centr. Halle*, 1872, *N.* 25.

Dry Narcotic Extracts; Correction.—The temperature given in Stromeyer's paper on this subject (see page 300 of July number) should be 50° C., and not 80°, as published.—*Archiv. d. Pharm.* 1872, *April*, 41.

To prevent Gum Solutions from Moulding, A. Hirschberg adds a few drops of sulphuric acid, and decants from the subsided sulphate of lime. After keeping for 18 months, it had neither moulded nor lost its adhesive properties.*—*Ibid. p.* 44.

The preservation of Milk by Boracic Acid has been experimented with by A. Hirschberg, who observed that two pounds recently drawn milk, in which 1 drachm of boracic acid has been dissolved, will show a very faint acid reaction, (temp. 10° R.=55° F.,) after 96 hours, but even after 120 hours, merely a thin film of cream had separated.—*Ibid.* 45, 46.

The Sugars in the Rhizome of Couch grass, Triticum repens, Lin., have been examined by Prof. H. Ludwig and H. Mueller, who found, 1, a sugar (fruit sugar) turning polarized light strongly to the left; 2, a sugar rotating to the right, (not cane sugar;) 3, a peculiar left rotating gum, copulated in a peculiar manner with nitrogenated compounds, and yielding, by splitting, left-rotatory sugar; 4, sweet compounds intermediate between this gum and fruit sugar, and copulated with nitrogenated compounds.—*Ibid. May*, 132–147.

To render Cloth and other Fabrics Moth and Water-Proof, a solution of acetate of alumina is prepared by mixing solutions of equal weights of alum and sugar of lead. The clear liquid is diluted with water and mixed with solution of isinglass. In this mixture the articles are left for about 12 hours, until they are thoroughly saturated, when they are dried and pressed, or otherwise finished.—*Chem. Centralblatt*, 1872, *No.* 22, *from Färber Ztg., No.* 8.

Cement for Chemical Apparatus.—Otto Facilides mixes syrupy solutions in benzine, prepared with the aid of heat, of shellac and

* For years past, we have used alum for this purpose, with the same good effect.—*Editor Amer. Jour. Pharmacy.*

caoutchouc. If applied with a brush to the corks used for the apparatus for preparing chlorine, the joints are perfect.—*Archiv d. Pharm., May*, 151.

New Reagent for Blood.—H. Struve found that the coloring matter of blood is best precipitated in the following manner: To the liquid containing blood, a little ammonia or caustic potassa is added, then a solution of tannin, and finally acetic acid, until the reaction is distinctly acid. The dark-colored precipitate, tannate of hæmatin, subsides rapidly, is easily collected, washed and dried, and yields, when treated with sal ammoniac and glacial acetic acid, the well-known hæmin crystals.

20 c. c. of urine containing 0·023 per ct. blood yielded an abundant precipitate, sufficient for many experiments for hæmin.—*Zeitschr. f. Anal. Chem.*, 1872, 29.

A source of Error in the Estimation of Sugar with Fehling's Solution has been pointed out by Dr. L. Brunner, who found that some kinds of filtering paper are very appreciably dissolved by alkaline solutions of copper; he, therefore, recommends to ascertain this behaviour of the copper solution for each lot of filtering paper, or to convert the cuprous oxide obtained in the process into cupric oxide.—*Ibid.* 32.

Examination of Indigo.—It is uncertain whether the presence of the other constituents of indigo besides the blue coloring matter, does not render the estimation of the latter by the oxidation process incorrect, or at least uncertain. J. Loewenthal believes that more reliable results are obtained from estimating the ashes, which sometimes amount to 29 per ct., while an excellent indigo yielded only 4·5 per ct. —*Ibid.* 45.

Modification of Pettenkofer's Test for Biliary Acids.—Strassburg* adds to the urine to be tested a little cane sugar, then moistens a piece of filtering paper with the liquid, and, after drying, places a drop of concentrated sulphuric acid upon the impregnated paper, which after ¼ minute shows the violet coloration beautifully, particularly in transmitted light. Normal urine does not produce this coloration, which appears if only 0·00003 biliary acids are present.—*Ibid.*, 97.

* Archiv d. Physiol. iv, 461.

Arbor vitæ in Small-pox.—The leaves of *Thuja orientalis* and *occidentalis* are employed in Belgium against small-pox. A tincture is prepared by macerating, for ten days, one part of the fresh leaves with 10 parts of 90 per cent. alcohol; it is given in water in doses of 10 drops.—*Journ. de Pharm. et de Chim.*, 1872, *May*, 382.

Ointment against Itching in Small-pox.—Dr. Gueneau de Mussy uses, when the itching is intolerable, a cerate composed of simple cerate 30·0, bromide of potassium 3·0, and camphor 0·3 grm. After the pustules have been followed by ulceration of the skin, the following application to the little ulcers is employed by the same physician: simple cerate 30·0, tannin 2·0, oxide of zinc 2·0, calomel 0·25, extract of opium 0·1 grm. During the intervals of the applications, it is useful to wash the sick parts with water to which a little tincture of benzoin has been added.—*Ibid.*, *June*, 436.

Camphor in Erysipelas.—Dr. Delpech recommends an ethereal solution of camphor, composed of equal weights of both, a few drops of which are from time to time put upon the erysipelatous surface; in most cases a rapid cure follows.—*Ibid.*

Disinfection of Sponges.—Leriche impregnates them witha solution of 4 parts permanganate of potassa in 100 p. water; they are afterwards put into a solution of sulphurous acid (25 to 100 water), and finally washed with much water.

By this treatment sponges acquire their original condition, even their marine odor, although they may have been soaked in pus and infectious matter. In the course of time they bleach without altering their tissue, even if subjected for four months to this process of depuration.—*Rép. de Pharm.*, 1872, *May*, 418.

A New Organic Matter in Diabetic Urine has been discovered by Professor Campani. It is precipitated by basic acetate of lead, and reduces four times more of Fehling's solution than is reduced by glucose; but it is devoid of rotating power upon polarized light.

Although the precise origin and true nature of this new body is not known, this discovery throws a doubt upon the correctness of the assays by volumetry in some cases of glycosuria; it deprives, in particular, a case of polyuria of all value, in which small traces of sugar were found, upon which ground an analogy has been supposed to exist between this disease and diabetes; and it follows, finally, that diabe-

tes is not a simple glycosuria, but that its morbid process consists in an altogether special alteration of the functions of assimilation and nutrition.—*Journ. de Pharm. d'Anvers*, 1872, *May*, 204, from *Gaz. Méd. de Paris.*

A New Property of Collodion.—At a recent session of the Berlin Society of Natural Sciences some explanations were made concerning a discovery of Mr. Kleffel, which is likely to lead to some useful applications. Kleffel found that if a glass-plate is covered with collodion, and, after this has become solid, a printed paper is pressed upon it with the hand, an impression of the letters is left upon the collodion, remaining discernible after the complete drying of the latter. The impression is best seen in transparent or in reflected light, after breathing upon the plate, the letters being depressed and clear, while the other portions are opaque.—*Pharmac. Zeitung*, 1872, *No.* 50.

ON THE PREPARATION OF ATROPIA FROM BELLADONNA LEAVES.

By J. Lefort.

Dry and coarsely contused belladonna leaves are exhausted by boiling water containing 10 grm. tartaric acid for each kilogramme of the leaves; the decoction is strained and evaporated to a soft extract, which is treated with strong alcohol heated to 50° C. (122° F.), to dissolve the tartrate of atropia. By treating the extract three or four times, only about a litre of alcohol is required for about 200 grm. of extract, the approximate yield of 1 kilogramme of leaves. From the dark brown tincture the alcohol is distilled off, leaving about 50 grm. of extract of a thick syrupy consistence, which in a suitable flask is agitated with one or two portions of ether, to remove a little resin and chlorophyll. The extract is now treated with a fresh portion of ether and with a solution of 8 grm. of caustic potassa in half its weight of water; on agitation, a little ammonia is disengaged from an ammoniacal salt, normally contained in the leaves, and the liberated atropia dissolves in the ether, which is several times renewed to completely exhaust the alkaloid. The ether is now distilled off, leaving a transparent, yellowish-brown, semi-solid extract, which is dissolved in water acidulated with sulphuric acid. A little resin is separated by filtration, bicarbonate of soda is added until effervescence ceases, when, on agitating with ether, all the atropia will

be dissolved, and obtained in a crystallized condition on the spontaneous evaporation of the ether.

The preparation of atropia by this process is as easy and satisfactory as from the root, and has the advantage of saving labor in not requiring the leaves powdered. It is to be observed that the extract, previous to its treatment with ether, has the consistence of grape sugar syrup; if more diluted, a portion of the alkaloid will not be dissolved from the aqueous liquid, except by considerable portions of ether.

Other advantages are that the loss of alcohol is entirely, and that of ether almost totally, avoided, the loss of the latter liquid occurring in the requisite spontaneous evaporation of the alkaloid solution. The author also draws attention to the probability of obtaining, by the same process, the alkaloids from the leaves of hyoscyamus, stramonium and aconite.—*Journ. de Pharm, et de Chim.*, 1872, *June*, 417–422.

SULPH-HYDRATE OF CHLORAL.

By M. H. Byasson.*

If anhydrous chloral be submitted to a current of dry sulphuretted hydrogen, at ordinary temperature, the gas is absorbed; and if the current be sufficiently rapid, there is a sensible amount of heat produced. In a short time the liquid anhydrous chloral becomes nearly solid; and in order to complete the reaction it is necessary to raise the delivery tube so as to be level with the surface. At the end of about twenty-four hours the reaction is terminated. The substance formed is completely solid, white, but presenting on its surface some portions colored reddish-yellow. By purifying this substance, first by distillation, and afterwards by crystallization, from ether or absolute alcohol, pure sulph-hydrate of chloral is obtained, presenting the following characters: It is white, has a very disagreeable odor, and a peculiar taste, which recalls that of chloral hydrate. It crystallizes by slow evaporation of its solution in ether, anhydrous alcohol and chloroform, either in rhomboidal plates or in four-sided right prisms. It melts at about 77° C., and boils at 123° C., under a pressure of 0·7385. It evaporates similarly to camphor, and its vapors will darken moistened paper impregnated with a soluble salt of lead at a

* Comptes Rendus, vol. lxxiv, p. 1290.

great distance. It is soluble in all proportions in anhydrous alcohol, ether, and chloroform. In the presence of water it is slowly decomposed, with a deposit of sulphur, the formation of sulphuretted hydrogen, which is given off, hydrochloric acid and chloral hydrate, which are found in the water, and a small quantity of a liquid which is deposited and has the appearance of tetrachloride of carbon. It is certain that in the presence of water the reaction is very complex, because the sulphuretted hydrogen exercises its reducing action upon the compound $C_4HCl_3O_2$,* as is shown by the deposit of sulphur and the formation of hydrochloric acid and chloride of carbon.

Under the influence of the hydrated alkalies or solution of ammonia, the reaction in the cold is rapid; the liquid is colored yellowish-brown, and chloroform is deposited. The solution contains sulph-hydrate of sulphide of the alkaline metal and formiate, and chloride of the same base. This reaction, analogous to that presented by chloral hydrate, and in which the formation of the chloride is secondary, may be represented by the following equation:

$$C_4HCl_3O_2,2HS + 2\,(KO,HO = C_2HCl_3 + C_2HKO_4 + KS,HS + 2HO.*$$

Submitted to the action of concentrated nitric acid, sulph-hydrate of chloral oxidizes rapidly, the disengagement of nitrous vapors is intense, and the reaction should be practiced upon small quantities at a time. Sulphuric acid is found in the liquid, and trichloracetic acid, the presence of which may be easily shown in the production of chloroform by the addition of potash, and which the author has isolated by distillation. This reaction may be expressed by the following equation:

$$C_4HCl_3O_2,2HS + 4(NO_5HO) = C_4HCl_3O_4 + 2(SO_4H) + 3NO_2 + NO_4 + 4HO$$

Concentrated sulphuric acid has no marked action in the cold; with heat there is production of anhydrous chloral, disengagement of sulphuretted hydrogen and sulphurous acid, and deposit of sulphur.

By oxidizing this substance carefully with nitric acid, adding chlorate of potash at the end of the reaction, and then estimating the sulphuric acid produced as sulphate of baryta, it was found as the mean of three analyses that 0·50 grams gave 0·635 grams of sulphate of

* C=6; O=8; S=16.

baryta. This was thought sufficiently near to the calculated number, 0·642, to justify, when taken with the preceding reactions, the formula $C_4HCl_3O_2,2HS$. It will be seen that the formula of the sulph-hydrate is that of the hydrate, with the water replaced by sulphuretted hydrogen.

This compound being decomposed by water or alcohol containing water, its administration is difficult. Quantities varying from 0·20 gram to 0·60 gram, in solution in ether, were injected into guinea pigs. The effects noticed were a diminution of temperature of about one degree; muscular relaxation with peaceable slumber for about two hours; no notable diminution of sensibility, and a slight acceleration of the heart's action. After the slumber the animal returned rapidly to the normal state.—*Pharm. Journ., Lond., June* 29, 1872.

USE OF HYDRATE OF CHLORAL IN THE MANUFACTURE OF TRICHLORACETIC ACID.

Trichloracetic acid, $C_4Cl_3O_3HO$, was discovered, as all chemists know, by M. Dumas, who obtained it by exposing in the direct rays of the sun large flasks containing crystalline acetic acid and chlorine gas in the proportions of nine decigrammes of acid to each liter of chlorine. Afterward it was found that it could be made from chloral, by oxidizing it with a mixture of chlorate of potash and hydrochloric acid. It has recently been found that it is sufficient to expose in the direct sunlight for three or four days a mixture of equal weights of hydrate of chloral and fuming nitric acid, allowing the action to go on until the red fumes cease to be given off. The mixture is then distilled with a thermometer. When the temperature reaches 195° C. the heat is kept steady at this point. The liquid distilling at this point may be considered as pure trichloracetic acid. The formula for this reaction is as follows:

$$\underset{\text{Nitric acid}}{2NO_5} + \underset{\text{Chloral hydrate}}{C_4Cl_3O_2H} = \underset{\text{Red fumes}}{2NO_4} + \underset{\text{Trichloracetic acid}}{C_4Cl_3O_3HO}.$$

This trichloracetic acid solidifies at 44° C., and fuses at 32° C.; its specific gravity is 1·618; crystallizes in colorless rhombohedra, is deliquescent, has a feeble odor, and a sharp, acid taste. It whitens the tongue like oxygenated water; volatilizes at 200° C., vapor density 5·8. Instead of using sunlight, the chloral can be put in a retort with fuming nitric acid, and at first it gets warm and gives off

nitrous fumes; then the action slackens little by little, and finally it is necessary to apply heat. After the excess of acid is gotten rid of, the residue is taken up with water and concentrated or allowed to crystallize.

The liquid trichloracetic acid has a slight resemblance to acetic acid, and is used as a cautery in medicine for removing warts and other excrescences on the body.

An interesting reaction of this compound is the formation of chloroform and carbonate of ammonia when boiled with an excess of ammonia.—*Journal of Applied Chemistry, June,* 1872.

INFLUENCE OF CERTAIN SALTS, BOTH ORGANIC AND MINERAL, ON THE CRYSTALLIZATION OF SUGAR.

By M. Marschall.

The formation of treacle in saccharine juices has been ascribed to the presence of certain salts, but nothing precise has been known on the subject. The author has prepared solutions of the various salts which may occur in the juices of beet-root. A volume of 10 cubic centimetres of each solution, of a known strength, was heated with 35 grms. of sugar in sealed tubes in the water-bath. The sugar was then allowed 17 to 24 days' time to crystallize out, at a temperature of 16° to 17° Centigrade. The amount of sugar and of salt present in the mother liquor were first determined. As 10 cubic centimetres of water dissolve 20 grms. of sugar, there was sugar enough to saturate the solutions. If, when the experiment was finished, the mother liquor contained more sugar than the same volume of pure water could contain, it is a proof that the salt experimented upon had caused the formation of treacle. If, on the contrary, the mother liquor contains less sugar than a solution in pure water, it is a proof that the salt has favored the crystallization of sugar by diminishing its solubility. Results:

1. *Salts Favoring Crystallization.*—Sulphate and nitrate of soda; sulphate, nitrate, and hydrochlorate of magnesia; nitrate and hydrochlorate of lime; aspartate of potash; acetate, butyrate, valerate, and malate of soda.

2. *Indifferent Salts, without Influence.*—Sulphate, nitrate, and hydrochlorate of potash; carbonate of soda; caustic lime; valerate, malate, and oxalate of potash; oxalate, citrate, and aspartate of soda.

3. *Salts Promoting the Formation of Treacle.*—Carbonate, acetate, butyrate and citrate of potash.

The latter are all salts very difficult of crystallization. The carbonate is particularly active. This fact explains why the addition of sulphuric acid to the juice sometimes increases the yield of sugar, the pernicious carbonate being converted into the indifferent sulphate. Sulphate of magnesia promotes the crystallization of 10 times, and chloride of magnesium of 17 times its weight of sugar; chloride of calcium 7½ times.—*Amer. Chemist, May*, 1872, from *Mechanics' Magazine.*

PARAFFINE, ITS MANUFACTURE AND USES.

By Prof. Charles A. Joy.

In 1830, Baron von Reichenbach, who died in 1869, discovered a white, waxy substance in the products of the distillation of wood, to which, owing to its permanent character and chemically indifferent properties, he gave the name paraffine, from *parum affinis.* Since that time it has been observed that it is produced during the distillation of many organic substances, such as resins, bituminous coal, lignite, brown coal, peat, fats, wax, bituminous shales, bog head coal, and that it occurs ready formed in petroleum, in the mineral ozokerite, in bitumen and earth wax. From being an article of insignificant chemical importance, it has risen to the front rank of valuable technical products. I distinctly recollect seeing in a small case at the Paris Exhibition of 1855 a few candles and a white block resembling spermaceti, on which was inscribed the word "*paraffine.*" Not one in ten thousand of the passers-by had the remotest knowledge of what it was. In the Paris Exhibition of 1867 this article made its appearance everywhere, and I dare say there were tons of it in the building. The applications of paraffine are now so numerous and important that it is difficult to trace them through all of their ramifications, and I can only aspire to a very imperfect attempt in this direction. The best source for the literature on the subject is Wagner's Annual Reports on Technology, and of that I shall make free use.

The methods for the manufacture of paraffine are different, according to whether it is a direct or an incidental product. I shall mention some of the most important processes actually pursued in the arts. That paraffine was contained in petroleum was known as early

as 1820, and Buchner, who found it at that time in the Bavarian oil, is sometimes called its discoverer. The idea of employing petroleum as a source for paraffine was not fully cultivated until 1856, when the market became supplied with an oil unusually rich in this material. American petroleum contains very little, but the Indian, and especially Rangoon and Java oil, affords from 10 to 40 per cent. The crude petroleum is distilled until 25 per cent. has gone over; the remaining portion is subjected to a higher temperature, and toward the last the paraffine goes over, which is condensed by surrounding the tanks with ice or artificial mixtures for the production of cold.

Latterly the manufacture from ozokerite has been conducted on an immense scale. The introduction of this name into commerce affords a striking illustration of successful advertising. It is said that the originators of the word spent twenty thousand pounds sterling in posting it on to every available dead wall, conspicuous rock, high fence, and in advertising it in every language and every country, until the curiosity of the whole world was raised to a high pitch in anticipation of the coming wonder. After waiting a number of years, public curiosity was gratified by the appearance on the market of some remarkably fine candles, which, on inspection, proved to be the well-known paraffine. The capital invested in the new enterprise is very large, and the production of pure paraffine somewhat startling. Ozokerite, as it is found in Austria, Moldavia, the Caucasus, and near the Caspian Sea, is a vegetable wax of a yellowish color, fibrous structure and light specific gravity. In its natural state it will melt readily, but requires to be wrapped around a wick before it will burn. About 300 pounds of the crude material are subjected at a time to fractional distillation in an iron still, provided with coolers and condensers. The yield is 8 per cent. oil and 60 per cent. paraffine. The oil is reserved for illuminating purposes. A small portion of the light oil, which boils before 212° F., is subsequently used in refining the paraffine. The crude paraffine contains an oil which is removed under a hydraulic press, and distilled to save adhering paraffine, and for other purposes.

The press cakes are melted and treated with sulphuric acid. The acid is neutralized with lime, and the paraffine distilled off. The product is again pressed, melted with the light oil mentioned above, and once more pressed. The final result is a perfectly white, transparent, hard substance, quite pure and inodorous, having a metallic ring, and

fusing at 63° C. (113° F.) Its chief use is in the manufacture of candles. The bitumen from Trinidad, Cuba, California, Nicaragua, Peru and Canada is also proposed as a source for paraffine. That from Trinidad yields nearly two per cent. The manufacture of paraffine by the dry distillation of peat and bog head coal is divided into two operations. 1. The production of tar. 2. The working up of the tar for illuminating oil and paraffine. Before the discovery of petroleum, this industry was regarded as one of great importance, and it was anticipated that most of our burning oil would come from this source. The trade name of the oil was *kerosene*, a word which has since been applied to refined petroleum. After the introduction of petroleum, the bog head industry declined in the United States, but it is still important in Scotland, where great quantities of paraffine are yearly made, according to Mr. Young's patent. Mr. Young originally subjected the bog head coal to a downward distillation, but numerous modifications have been introduced according to the nature of the crude material. More attention has latterly been bestowed upon the coolers and condensers than formerly. The methods of compressed air, ether engines, and condensation of ammonia, have been applied to the cooling of paraffine on a large scale, and the yield has thus been appreciably increased.

It is in this method of artificial refrigeration that the chief progress has been latterly made. Paraffine, in its pure condition, is a white, waxy, inodorous, tasteless substance, harder than tallow, softer than wax, with a specific gravity of 0·877. Its melting point is variable, depending somewhat upon its origin. It ranges between 43° C. and 65° C. (109° F. and 151° F.) An ultimate analysis yields, on the average, carbon 85 per cent. and hydrogen 15 per cent. It is insoluble in water, and is indifferent to the most powerful acids, alkalies and chlorine, and can be distilled unchanged with strong oil of vitriol. Warm alcohol, ether, oil of turpentine, olive oil, benzole, chloroform and bisulphide of carbon dissolve it readily. It can be mixed in all proportions with wax, stearin, palmitine and resin. As stearin is less soluble in benzole than paraffine, Vogel proposes this reaction as a method for detecting the adulteration of paraffine with stearin. Further properties can be inferred from the uses to which it is applied. It burns with a wick, and gives much more light than stearin or wax, but as it melts at a low temperature, it cannot be advantageously employed alone. When required for candles, it is melted with stearin

wax and spermaceti, to render it less liable to bend over in warm weather, or to run. There are single establishments in Germany capable of turning out 250,000 candles daily, and in England even these figures are exceeded. As the melting point of paraffine is low, it is proposed to employ it for the preservation of meat. Meat several times immersed in a bath of melted paraffine will keep for a long time, and when wanted, it is only necessary to melt off the adhering wax-like coating to prepare it for cooking. For stoppers to acid bottles, to coat paper for photographic and other uses, as a lubricator, for candles, as burning oil, to coat pills, in the refinery of alcohol and spirits, paraffine now finds ready use. It has also been employed for the adulteration of chocolate and candies; for the preservation of railroad timber; to saturate filter paper for certain purposes; to coat the sides of vessels in which hydrofluoric acid is to be kept; to preserve fruit from decay; for oil baths of constant temperature; to prevent the oxidation of the protoxides; to render fabrics waterproof; as a substitute for wax in the manufacture of matches; as a disinfecting agent and as a varnish for leather.

Franz Stolba, of Prague, suggests the use of paraffine as a coating to vessels of glass or porcelain when these are acted upon by certain liquids to be set aside for crystallization. The paraffine is put into the capsules, previously well dried and heated, till it commences to boil; the vessels are then turned about so as to bring the paraffine in contact with the whole of the interior surface, and then empty out the surplus. After cooling, it is found to hold well, and the vessels are ready for use. Of course the solutions to be crystallized must not be heated, but left to spontaneous vacuum evaporation.

Wine and beer casks are rendered tight by paraffine, and its introduction into the vacuum pans of the sugar industry is said to prevent frothing of the syrup. Plaster casts are coated with it; drawing paper is rendered transparent; parlor matches are tipped with it; sponges are kept elastic; cloth is rendered water-tight, and it is employed to keep shoemakers' wax soft and pliable. A paraffine insulator is in use upon some of our telegraph lines, and as there are few substances that can attack or decompose paraffine, its value in many chemical processes is obvious. One of the most recent uses is in the manufacture of sulphuretted hydrogen gas. If sulphur and paraffine be boiled together in a flask, decomposition takes place, and a copious supply of sulphuretted hydrogen is given off. I have found this to

be one of the most convenient methods for the preparation of this gas for class-room experiments. In medicine, the preservative and protective properties of paraffine are brought into frequent requisition, and in candles it also plays a part.

Such are some of the leading features in the manufacture and uses of paraffine.—*Journal of Applied Chemistry, July*, 1872.

LINIMENT OF AMMONIA.

By R. Rother.

The officinal liniment of ammonia is prepared by mixing one fluid ounce of officinal 10 per cent. ammonia water with two troy ounces of pure olive oil. When these directions are strictly complied with, a result approaching the officinal requirements will most usually be obtained. The proportions of the two ingredients in this case are about one measure of the first to three measures of the second. Now if, however, as is often done, a pure article of oil be employed in a smaller proportion, together with a stronger ammonia, that is, about equal measures of each, then either no saponification will take place until after some time, or but very imperfectly, at the moment of mixing; quite a similar action occurs if a stronger ammonia be used, even in the officinal proportion, with pure olive oil. It is therefore evident that in connection with pure olive oil the ammonia must not only be weak, but in an inferior proportion. But it is generally known that the common commercial oil produces a much superior liniment. Yet in this case a stronger ammonia must be applied than in the officinal process; it is also necessary, in order to produce a sufficiently fluid preparation, to augment the quantity of this equal to the bulk of the oil. Commercial olive oil cannot be substituted for the pure oil in the officinal process. If one fluid ounce of 16 or 18 per cent. ammonia water be mixed with two troy ounces of commercial olive oil, a very thorough saponification is effected, but the resulting liniment is too thick to pour, acquiring a gelatinous nature similar to soft soap. With the use of officinal ammonia in this experiment, the oil is less perfectly changed, and the mixture assumes a curdy appearance; consequently neither of these modifications of the officinal proportions in the employment of commercial oil is satisfactory. The writer, however, observed that the gelatinous magma produced by the action of ammonia, on whatever oil of any kind, was instantly liquified by a

small proportion of alcohol, forming a mixture which in every respect conforms with the true characteristics of ammonia liniment. Therefore, if in the preparation of this liniment a magma results that cannot be poured from a bottle, add to the jelly a quantity of strong alcohol equal to one-sixteenth of the whole volume.—*The Pharmacist, June*, 1872.

MATERIA MEDICA NOTES.

By James Collins, F.B.S.E.,
Curator of the Pharmaceutical Society's Museum.

Gum Euphorbium.—Dr. E. Cosson, in an interesting note on *Euphorbia resinifera*, Berg, read before the Royal Botanical Society of Belgium, verifies the statement of Berg, that the Gum Euphorbium of commerce belongs to the species to which Berg gave the name of *E. resinifera*. Dr. Cosson found in Von Martius' collection at Brussels, a specimen of Gum Euphorbium with sufficient of the dried stems of the plant producing it to give a good idea of the plant. Probably Von Martius received these specimens from his brother, Dr. C. W. T. Martius.

The history of this acrid gum is very interesting. *E. canariensis*, L., *E. officinarum*, L., *E. antiquorum*, L., and *E. tetragona*, Haw., have each been accredited with its production; but Dr. Pereira, who examined the question with his usual critical ability, stated that only *E. canariensis*, fulfilled all the requisite conditions of locality, etc.; and that he felt little hesitation in ascribing the gum to this plant. He says (Elements Mat. Med. vol. ii, pt. 1, p. 399, 1855) that the specific characters "apply to the branches found mixed with the Euphorbium of commerce. They agree with the description and figure of *Tithymalus aizoides lactifluus*, the *Euphorbia canariensis* of Plunkenet." Miller also (Gard. Dict. vol. i, art. Euphorbium) states that in looking over some Euphorbium in a shop, he "found several spines amongst it, which exactly agreed with those of that plant." Pereira found in some specimens of the gum, spines resembling those of *E. tetragona*, Haw.

But better materials led Berg to trace its origin to a new species, to which he gave the name of *E. resinifera*, and described from dried remains picked out of the gum. *E. resinifera* has a stem one-third the size of that of *E. canariensis*, and stalked umbels, whilst *E. canariensis* has almost sessile flowers. Berg gives figures in "Berg und

Schmidt, Darstellung und Beschreibung sämmtlicher in der Pharmacopœia Borussica officinellen Pflanzen." The gum contains 20 per cent. of an acrid principle Euphorbin ($C_{26}H_{22}O_2$), so acrid indeed that in the collection of the gum the fingers became excoriated if brought into contact with it, and it is the practice to cover the mouth and nostrils to avoid the excessive sneezing which would otherwise ensue. The best general account of the production of this gum is that of Jackson, in his "Account of Morocco."

Dr. Cosson has also compared the various materials he has with a growing plant at Kew (which has not yet flowered), sent by Mr. F. Cartensen, the English Consul of Mogadore. If the history of this plant can be satisfactorily attested as being the species actually producing the gum, its flowering will be looked to with some degree of interest, as the question can then be set completely at rest.

Cinchona Rosulenta.—Mr. Howard has recently cleared up another doubtful point in the cinchona question. He has described and figured in the "Bulletin de la Société Botanique de France" a new species, named *Cinchona rosulenta*, a native of Ocana in New Granada. The vernacular name appended to the specimens of this plant, which were collected by Purdie in October, 1845, is "Quina de la tierra fria." *C. rosulenta* is very close, both in appearance and chemical composition, to *C. succirubra;* the bark, however, has a more roseate hue, and the leaves approach *C. ovata*, the nerves, however, being more rigid and prominent. Mr. Howard identifies this species with the *Quinquina rosé* d'Ocana, of M. Delondre, a figure of which is given in that author's "Quinologie;" also with M. Rampon's *Quinquina à quinidine*, described in Dr. Planchon's "Des Quinquinas;" and also with Dr. Wittstein's "*Pseudo-regia.*"

This bark has long been known in French commerce under the name of "Quina rosé," and we are grateful to Mr. Howard for thus clearly settling its synonymy, and giving it a botanical position.—*Pharm. Journ., Lond., June* 29, 1872, from *Journal of Botany.*

POPPY CULTURE IN AUSTRALIA.

Some attention has recently been given to the cultivation of the poppy for commercial purposes in various parts of Australia. From a letter which recently appeared in a colonial paper, describing the results of an experiment in poppy culture in the Bendigo district, we

gather the following interesting facts. About a drachm of the seed, which was that of the white variety, was sown in the early part of August along each of three drills, 86 feet long and two feet apart, and were lightly covered with small firewood, bark and sand. The land was rather heavy, and mixed with a good deal of quartz. It had been well manured and broken up; grape vines had been grown on it for a succession of years. On the 18th day after sowing, the young shoots were visible, looking like fine blades of grass, and they continued to grow pretty well. When between five and six inches high they were weeded out, and several were transplanted, but all the latter died, in consequence, probably, of insufficient watering and the heat of the weather. By the 20th November the others were flourishing "like great cabbages." These began to flower pretty freely by the first week in December, by the time the plants were about five feet or five feet eight inches high. The capsules produced varied in size from one inch to two and a half inches in diameter. After the petals had fallen off, and while the stamens were still clustering round the neck of the capsules, horizontal incisions half round the heads at the lower part were made. A creamy juice exuded from these cuts, which were made in the afternoon, and it soon became pinkish, and by the following morning brownish red, and of a tenacious consistence, when it was scraped off with a sharp straight knife, and collected on the edge of a small tin cover, which plan is recommended as being less troublesome and not so wasteful as the usual one of gathering the opium upon the poppy leaf. Each poppy head did not yield more than equal to the bulk of a small pea, and from all the plants raised from the drachm of seed 250 grains of opium were collected; but it must be borne in mind that many plants were entirely lost, and others not matured. The opium collected was considered to be of very good quality.

The conclusions arrived at from this experiment are that the poppy requires a certain amount of careful nursing and a pretty liberal supply of water. The distance between the rows should be three feet, to allow of the full growth of the leaves and room to pass between the plants when collecting the juice. A sheltered aspect should be chosen, so as to protect the plants from strong winds. Finally, the writer says,—"The collection of the product is not, to say the least, very agreeable; and, from the length of time occupied by it, the labor must be very cheap for the crop to pay. Perhaps the plant might be cultivated with profit near industrial schools. In conclusion, I think the

opium poppy can be successfully raised in this district if a plentiful supply of water be available when necessary.—*Pharm. Journ.* (*London,*) *June* 22, 1872.

SPONGE FISHING.

From the account given by Vice-Consul Green, of the Tunisian sponge fishery in his report to the Foreign Office, which has lately been issued, it would seem that to fish for sponges requires as much if not more skill than to fish for salmon. The sponge fishery is most actively carried on during the three months of December, January, and February, for at other seasons the places where the sponges exist are overgrown with seaweeds. The storms during November and December destroy and sweep away the thick marine vegetation and leave the sponges exposed to view. The fishery is divided into two seasons, namely, summer and winter; the former commencing in March and ending in November, and the latter as noted above. But the collection of sponges is not very productive in summer, as it is confined to the operations carried on with diving apparatus, which can only be used on rocky and firm bottomed places, or to the success of native fishermen, who wade along the shores and feel for sponges with their feet among the masses of seaweed. The sponges thus collected by the Arabs are also of an inferior quality, owing to the small depth of water in which they have grown. As, nevertheless, calm weather and a smooth sea are essential for the success of the fishermen, the winter season, although lasting three months, does not generally afford more than forty-five working days. The Arab inhabitants of the coast, Greeks, principally from Kranidi, near Nauplia (Napoli de Roumania), and Sicilians, are chiefly employed in the sponge fishery, the Greeks, however, being the most expert fishermen, while the Arabs are the least skillful. Sponges, says the "Pall Mall Gazette," are obtained by spearing with a trident, by diving with or without the assistance of an apparatus, or by dredging with a machine somewhat similar to an oyster dredge. The Arab fishermen, principally natives of Markenah and Jerbah, employ boats called sandals, manned by from four to seven persons, one of whom is the harpooner, while the others manage the sails, etc. The spearman watches for the sponges from the bows of the sandal, and the boat is luffed round upon his perceiving one, so as to enable him to strike it. The depth

of the sea in which the Arabs fish is from fifteen feet to thirty-five feet. Although the Greeks are most expert divers, the majority of them use the spear. They employ small and light boats, just sufficient to carry a spearman and an oarsman. The boat is rowed gently along, while the spearman searches the bottom of the sea by means of a tin tube of fourteen inches in diameter by nineteen inches in length, at one end of which is placed a thick sheet of glass. This tube is slightly immersed in the water, and enables the fisherman to view the bottom undisturbed by the oscillations of the surface. The spears used by the Greeks are shorter than those employed by the natives and Sicilians, but with wonderful adroitness they are enabled to reach sponges covered by sixty feet of water. They hold in their hands from three to four spears, and dart them so quickly and with such precision, one after the other, that before the first has time to disappear under the surface the second strikes its upper extremity, and thus gives it additional impetus to reach the sponge aimed at. The Sicilians, also, fish with a spear and in small rowing boats, but do not understand the employment of the tube, and have not acquired the knack of the Greeks in using three or four spears; they consequently seldom secure an equal quantity of sponges, although they are always more successful than the Arabs. The produce of the fishery is, it is stated, susceptible of considerable augmentation by an increase in the number of fishermen, and a new sponge is reproduced within a year wherever one has been removed.—*Scientific American, July* 13, 1872.

DUGONG OIL.

Among the many attractive portions of the International Exhibition, none is perhaps more worthy of attention than the Queensland Annexe, which has, we believe, been erected at the cost of that young but vigorous colony. The evidence of great material wealth in gold, copper, coal, wool, cotton, sugar and tobacco, to say nothing of arrowroot, tea, coffee, etc., are enough to show us that much may yet be expected of this portion of Australia. On one table are exhibited a large number of tins of preserved meat, and a case containing specimens of the bones, flesh, skin, meat and oil of the dugong.

As we have received several letters recently, containing inquiries respecting this animal and the economical products obtained from it,

we take this opportunity of laying before our readers such information as we have been able to obtain.

Near the case in question is a specimen of a "Dugong sucking calf," lent, as a card attached to it informs us, by Professor Flower, of the Royal College of Surgeons, Lincoln's Inn Field. This "calf," which is between four and five feet long, has a very curious head, and flippers instead of fins.

In the case are the skull and some of the rib bones of a full-grown dugong cow, a piece of the dried skin, nearly an inch in thickness, several teeth and tusks, a piece of dried meat, stated to be a piece of a calf, and which looks and, we were assured, tastes precisely like bacon, and a few bottles of a white substance not unlike lard or dripping, labelled "Dugong Oil," which is announced as "the great Queensland remedy for consumption. It appears to have been first prescribed for that disease by Dr. Hobbs, of Brisbane, who was led to use it in his practice through observing the wonderful effects the mere eating of the flesh of the animal had on the aboriginals when suffering from lung diseases. It is claimed for this oil that it is not only quite equal to cod-liver oil in the treatment of affections of the lungs, but that it is also a remedy for diseases of the stomach and bowels and general debility, indigestion and biliousness, as well as chronic coughs and wasting in children. But its chief peculiarity is reported to be that, far from partaking of the nauseousness of cod-liver oil, it is actually pleasant to eat as an article of food, and can thus be taken by people of a delicate appetite when the stomach entirely revolts from cod-liver oil.

At a dinner given by Mr. Danetree, the Agent General of Queensland, in the Annexe, on the 10th inst., dugong oil bore a very prominent part in the *menu*. Both pastry and biscuits were introduced, in which the oil took the place of butter or lard, and we are informed that the general opinion was that it was in every way a success. The London correspondent of the *Newcastle Daily Express*, in writing to that journal says, "Lighter or more delicious pastry than that in which this oil had taken the place of lard, I never tasted. The same thing may be said of the biscuits, which were everything that biscuits ought to be."

The fish, or more properly speaking, the animal, from which this oil is procured, is a herbivorous cetacean, and would probably be ranked by naturalists midway between the whale and the seal. It is

found in very large numbers in the waters of Northern Queensland, and more infrequently in the southern portions as far as Moreton Bay, beyond which it does not appear to go. It is also said by various authorities to be found in the Indian Archipelago and Indian seas as well as at Mauritius. It grazes on the thick grass which in those warm latitudes grows on the shallows between the islands and along the coasts, where it usually feeds in from one to four fathoms of water, coming up to breathe at short intervals. It is not amphibious, but comes in and goes out with the tide, feeding only during high water. Like most other animals of this order, it is gregarious, and vast mobs of many hundreds and even thousands are frequently seen.

The dugong varies in length from seven to twelve feet, and its weight may be averaged at from six to seven hundred weight. The head is not unlike that of an ox lacking the horns, while the skin more nearly resembles that of the pig. The dam or cow brings forth its young alive and suckles it at the breast, holding it there with her arm-like flipper. All authorities join in attesting the wonderful attachment the female dugong has for her young, so much so that if the calf be killed, the mother makes no attempt to escape, but falls an easy prey. The skin averages from one to two inches in thickness, and the bones are perfectly solid and very similar to ivory, being very heavy, probably to assist the animal in sinking easily to its pasture. The fat meat from which the oil is procured lies next to the skin, and is not unfrequently mixed with layers of lean, giving it a perfect resemblance to bacon, like which it also tastes. Some eaten at the dinner before alluded to in the exhibition was pronounced to be very fair ham. The lean meat is said to be very similar to tender lean beef, and is readily sold in its salt state as a breakfast relish in Queensland.

It will be apparent that an article having the advantage claimed for dugong oil, that it is capable of being taken as an article of food, will command a large sale if only its medicinal properties are such as is asserted. As yet there has been no opportunity for testing the oil to any extent in England, but several very strong testimonials as to its value as a medicine, given by colonial medical men, are published by the firm interested in its sale. In the pamphlet are narrated cases of dyspepsia, debility, consumption, liver complaint, indigestion, etc., which are stated to have been cured by its use. The oil certainly deserves a trial by the profession with a view to arriving at its actual alue.

We believe we are correct in saying that at present there is not any attempt being made to introduce dugong oil to the English market. The gentleman who exhibits it at the International Exhibition has only imported a small quantity in order to bring it under the notice of the medical profession. At present the demand in the colony is quite equal to the supply, and before that can be greatly increased a much larger capital will have to be invested in the fishery. With a view to fostering this enterprise, (which in Queensland is looked upon as likely to become of very great value,) the government proposes granting special rights for a few years if a certain amount of capital is invested, so that those who go to the expense attendant on creating a new industry and introducing this novel medicine to the world, may have a fair opportunity to repay themselves for their outlay. Arrangements are now in progress to take advantage of this concession. —*Pharm. Jour. and Trans.*, *June* 6, 1872.

DETECTION AND ESTIMATION OF PARAFFIN IN STEARIN CANDLES.

By M. Hock.*

Makers of stearin candles mix paraffin with the fatty mass in quantities up to 20 per cent. Paraffin candle makers also mix stearic acid with their paraffin and attribute valuable properties to such a mixture, as far as candle-making is concerned. The attempt to determine if paraffin be present, and if so, to get some approximate idea of the quantity, in a sample of stearin and *vice versâ* by means of the comparison of the melting point and specific gravity of such a mixture is shown to be useless, as these vary according to the source from which the paraffin is obtained, as also in the case of the stearic acid, since the pure commercial article is by no means a chemically pure article.

A good method for detecting the presence of stearic acid in paraffin has been devised by R. Wagner, viz. by treating a boiling solution of the paraffin in alcohol with an alcoholic solution of neutral lead acetate, when, if stearic acid be present, a dense floccular precipitate appears, but none if it be absent. The best method, and one which can be used quantitatively as well as qualitatively, is described as follows:—Not less than five grams of the candle are taken and treated with warm solution of potassium hydrate, which must not be too con-

*Dingl. Polyt. J., cciii, 313—315.

centrated. A soap is formed with the stearic acid, whilst the paraffin is left unaltered. Sodium chloride is thrown into the solution, whereby the soap is separated out as a soda soap, and in precipitating takes down the paraffin with it. The soap obtained is thrown on the filter and washed with cold water or very dilute spirits of wine. Thus, firstly, the sodium chloride is washed out, and finally, the soap is brought into solution and likewise washed through the filter, leaving the paraffin, which is then dried at a temperature below 35° C. so as not to fuse it. The paraffin is then treated on the filter with ether, and after repeated washing with this solvent, the ethereal solution is carefully evaporated in a weighed porcelain crucible, in the water-bath, at a low temperature. The residue consisting of the paraffin is then weighed, and the stearic acid is estimated by difference.—*The Phar. Jour. and Trans., July* 6, 1872, *from Journal of the Chemical Society.*

Varieties.

Belgian Pharmacopœia.—By a decree of the King of the Belgians, dated 27th February, a commission has been instituted of professors of the medical sciences to revise the official code of that country, and the Drs. Crocq, Chandelon, Depaise, Gille and Lesebre have been named as members of the committee.—*Med. Press and Circ., Lond., June* 5, 1872.

Paraffin.—Not long ago, the whole stock of paraffin wax in the world did not exceed four ounces, which was carefully preserved in the laboratory of Prof. Liebig as a chemical curiosity. There is now produced in Scotland alone a quantity of not less than 5,800 tons annually.—*Journ. Applied Science, Lond., July* 1, 1872.

Conversion of Pyro-Phosphates into Phosphates.—M. Prinvault.—When boracic acid is fused along with pyro-phosphate of soda, and the fused mass taken up with water, there is formed ordinary phosphate of soda; the pyro-phosphate of soda has thus absorbed an equivalent of water of constitution by the action of the boracic acid. It is, the author thinks, probable that phospho-borate of soda is formed, which is decomposed by the water into boracic acid and ordinary phosphate of soda. The action of sulphuric acid, when converting pyro phoshate of soda into ordinary phosphate of soda, is explained by the author as due to the formation of an alkaline phospho-sulphate.—*Chem. News, Lond., June* 7, 1872, *from Compt. rend., May* 6.

Preparation of Caustic Soda by means of Sulphuret of Sodium.—Tessié du Motay.—The author distinguishes between processes by the dry and the wet

way. The former is described as follows: When one equivalent of sulphuret of sodium is mixed and fused with one equivalent each of caustic soda, hydrate of lime and metallic iron (either cast or malleable), and these substances heated to redness, the sulphuret of sodium is completely converted into caustic soda, while sulphuret of iron is simultaneously formed. This reaction is explained by the author as follows: The water of the hydrate of soda, or of the hydrate of lime, is decomposed by the iron which becomes oxidized, hydrogen is set free, oxide of sodium formed, and next sulphuret of iron; the soda is separated from the last-named substance by lixiviation with water. As regards the process by the wet way, the author converts the sulphuret of sodium into a basic phosphate of soda by means of a rather circuitous process (scientifically correct, but not well adapted for industrial application), and this basic phosphate of soda is next converted into caustic soda by means of caustic lime.—*Ibid., from Les Mondes, May* 2.

Influence of the Potassa and Soda Salts upon Alcoholic Fermentation.—C. Knapp.—After first referring, at some length, to the researches of physiologists on the action of the potassa salts upon the animal organism, the author details at length a series of experiments made with the view to ascertain the difference of action—if any—upon the process of fermentation of sugar solutions to which yeast is added. While it is evident, from these researches, that potassa salts accelerate the fermentation, while soda salts are inactive, the mode of action of the first named salts is not precisely clear.—*Ibid., June* 21, 1872, *from Ann. d. Chem. a. Pharm.*, 1872, *N.* 7.

On Sexbasic Saccharate of Lime.—H. Déon.—When tribasic saccharate of lime is treated with alcohol the sexbasic saccharate is obtained by elimination of one half of the sugar, exactly in the same way as by treatment of the monobasic saccharate with alcohol yields the bibasic saccharate; while the monobasic and tribasic saccharates contain water, the bibasic and sexbasic saccharates contain none. The reactions are thus analogous, and may be expressed by the following formulæ: $C_{12}H_{11}O_{11}6CaO$, derived from—

$$2(C_{12}H_{11}O_{11}3CaO+HO)C_{12}H_{11}O_{11}2CaO,$$

derived from $2(C_{12}H_{11}O_{11}CaO+HO)$; when sexbasic saccharate is combined with two equivalents of sugar, bibasic saccharate is obtained,—and when two equivalents of sugar are added to tribasic saccharate, monobasic saccharate is formed.—*Ibid., June* 28, 1872.

Digestion of Calomel—In his recent lecture on "Diet and Medicine," Dr. Symes Thompson showed that some drugs undergo a process of solution within the body, analogous to that which food passes through under the influence of the digestive juices. With the assistance of Professor Heaton he demonstrated Tuson's experiment on calomel. In one vessel (*a*) calomel and hydrochloric acid were placed, and in another (*b*) calomel, acid and pepsine. After digestion for two or three hours, at the temperature of the blood (care being taken that the heat should not rise above 140° Fahr.), the contents of both vessels were thrown on filters. The filtered liquid from the second (*b*) gave a black precipitate with sulphuretted hydrogen, showing that pepsine had ren-

dered the calomel soluble, while the liquid from the first (*a*) was unaffected by the gas. This experiment has served to remove much of the difficulty previously felt of accounting for the effect of a salt insoluble in acid, and is of value as showing why calomel does not produce its characteristic effects in cholera and other conditions in which the digestive powers are in abeyance, or when the active ingredients of the gastric juice are wanting.—*Nashville Journ. of Med. and Surg., July*, 1872, from *Medical Press and Circular.*

Celery as a Nervine.—A correspondent of the "Practical Farmer" says (Med. Bulletin, Cincinnati Med. Repertory), "I have known as many men, and women too, who, from various causes, had become so much affected with nervousness that when they stretched out their hands they shook like aspen leaves on windy days; and by a daily moderate use of the blanched foot stalks of the celery leaves as a salad, they became as strong and steady in limbs as other people. I have known others so very nervous that the least annoyance put them in a state of agitation, and they were in almost constant perplexity and fear, who were effectually cured by a daily moderate use of blanched celery as a salad at meal times. I have known others cured by using celery for palpitation of the heart.—*Georgia Medical Companion, June*, 1872, from *Med. Cosmos, Nov.*, 1871.

Verbena Water.—A good article may be made in the following way:

Take Rectified Spirit,	1 pint.
Grass Oil (Verbena Oil),	3 drachms.
Oil of Lemon-peel,	2 ounces.
Oil of Orange-peel,	½ ounce.

Mix. Let it stand for a few hours, filter if necessary and fill in bottles.

A very much superior article, also sold in commerce, under the name of *Extrait de Verbène*, is made according to the following recipe:

Take Rectified Spirit,	1 pint.
Oil of Orange-peel,	1 ounce.
Oil of Lemon-peel,	2 ounces.
Oil of Lemon,	1 drachm.
Grass Oil (Verbena Oil),	2½ drachms.
Essence of Orange-flowers,	7 ounces.
Essence of Tuberose,	7 "
Essence of Rose,	½ pint.

—*Canad. Pharm. Journ., May*, 1872.

Improved Blow-pipe.—A common wide-mouthed bottle is carefully fitted with a caoutchouc cork, bored with two holes, into each of which passes a piece of glass tube, bent at a right angle. On to one of these tubes is slipped the caoutchouc tube, coming from an ordinary caoutchouc bellows, whilst the other is put in communication with the blow-pipe nozzle by means of four pieces of caoutchouc tubing, joined by three pieces of glass tube, drawn to a fine point

at each end. This forms the main peculiarity of the arrangement. When air is forced into the bottle by the blower in jerks, it finds a difficulty in escaping as fast as it comes in, on account of the six fine openings in the glass tubes that it has to pass through on its way from the bottle to the nozzle, and it thus acquires a certain pressure in the bottle and flows out toward the nozzle as a regular blast. The bottle may be about 6 inches high by 3½ inches wide, with a neck 1½ inch diameter; but of course the dimensions are of no great importance. On the whole, a somewhat large bottle is better than a small one. The pieces of glass tubing we use are 2 inches long by ⅛ inch in diameter. The apparatus will be stronger if, instead of a glass bottle, a tin cylinder is used, about 4 inches high by 2 inches in diameter, with two tin tubes opening into its top. Small metal cylinders, with a fine hole at each end, may be used instead of the little glass tubes. A blowing apparatus constructed in this manner will deliver a perfectly regular blast, and will be of practical interest to those who are thinking of working in places where it is difficult or impossible to repair the ordinary instruments.—*Scientific American, July* 6, 1872.

On the light emitted by the vapor of iodine.—Salet has found that the vapor of iodine may be heated to redness like a solid or liquid. It then emits the less refrangible luminous rays which furnish a continuous spectrum. The experiment is easily made by heating the iodine in a tube of Bohemian glass. A small crystal of iodine is placed in a tube of thick glass, which is then heated strongly at some distance from the crystal. When the glass is red for a considerable part of its length, it is to be allowed to cool until it is no longer visible in the dark; the iodine is then to be rapidly volatilized. The colored vapor reaching the heated part of the tube then glows with a distinct red light. This experiment shows that the iodine becomes luminous at a lower temperature than glass. Another method of exhibiting the incandescence of the vapor of iodine is the following: A spiral of fine platinum wire is sealed in the interior of a tube of glass eight millimetres in diameter. Pure iodine is then introduced into the tube, which after expulsion of the air is sealed. If the iodine be then volatilized and the wire ignited by a battery, the spiral appears surrounded by a flame of a very rich red color, which yields the well-known interrupted spectrum.—*Am. Jour. of Science and Arts, July*, 1871, *from Comptes Rendus*, Tome lxxiv, p. 1249.

Photo-engraving on Metals.—A recent process for producing engraved surfaces in metal by photography is described as follows: A pure silver (or alloy) surface is first taken, and after finely polishing or frosting it is exposed to the action of iodine, and a film of iodide of silver thus obtained. The plate is then exposed to the action of light, in the camera or under a photographic negative, until a faint image is obtained. It is then submitted to the action of an electrotype battery (copper solution) when a well defined image of the object is obtained in copper (the copper only attaches itself to those portions of the plate which have been rendered conductors of electricity by the action of the light). The plate is next dried and etching solution poured over it, composed

of sulphuric acid and nitrate of potash (or their equivalents). This immediately attacks the shadows, or exposed portions of the silver surface, while the copper parts from the electrotype bath are not affected. After etching to the required depth, the copper deposit may be removed by *aqua regia*, leaving a finely etched image on the silver plate. To engrave on steel, copper, etc., it is first necessary to coat the surface with pure silver, after which the process is substantially the same as that above described, with some modifications of the acids or combinations used, according to the nature of the metal employed.—*Journ. of the Franklin Institute, July*, 1872,

Pharmaceutical Colleges and Associations.

Maine Pharmaceutial Association.—The fifth annual meeting of the Maine Pharmaceutical Association convened at the Library Room of the Portland Army and Navy Union, Tuesday, July 16, 1872, at 3.45 P.M. The Secretary, Mr. C. Way, being absent, on account of indisposition, Herschell Boynton was chosen Secretary *pro tem.* The minutes of the last meeting were read and approved. After the election of new members, the election of officers was postponed until the next meeting. The report of the Treasurer was then read and accepted, after which the President read his annual address, which, on motion, was ordered to be published in full in the forthcoming book of Proceedings of the Association. Mr. Schlotterbeck then read a paper upon purified extract of liquorice, which was accompanied with specimens, and was referred to the Committee of Publication. The Treasurer was authorized to deposit funds lying unused in his hands, in the savings bank, according to the exercise of his best discretion. Portions of letters from the gentlemen appointed delegates to the Maine Pharmaceutical Association from the Vermont Pharmaceutical Association, were then read, in which the writers expressed their regret at their inability to be present at the meeting, their sympathy and cordial co-operation in the object aimed at, and the salutations of the Green Mountains to the Pine Trees. The President was empowered to accredit delegates to attend the meeting at Montpelier.

The subject of change of time for the annual meeting came up, and it was voted to test the matter experimentally, and to adjourn to the third Tuesday of October next ensuing. With a vote of thanks to the P. A. and N. U. for the use of their beautiful and quiet room, the Association adjourned.

Cincinnati College of Pharmacy.—The faculty of this College has been remodelled, and consists now of Messrs. Edward S. Wayne, Professor of Materia Medica and Botany; J. F. Judge, Professor of Chemistry, and W. B. Chapman, Professor of Pharmacy.

Louisville College of Pharmacy.—Dr. Thos. E. Jenkins has retired from the chair of Materia Medica and Botany. The vacancy has been filled by the election of Mr. Emil Scheffer.

California Pharmaceutical Society.—The 31st regular meeting was held on May 8th, President J. A. Bauer in the chair. After the transaction of the usual business of the Society, the Board of Directors reported a list of sixteen names of persons eligible to be nominated for the election of a Board of Examiners, as required under the act lately passed to regulate the practice of Pharmacy in the City and County of San Francisco. The election being held, the following gentlemen were elected to constitute the Board of Examiners: John Calvert, Wm. T. Wenzell, Jas. G. Steele, Wm. Simpson and J. W. Forbes.

The Secretary called the attention of the meeting to the non-payment of dues on the part of some country members, and requested instruction; when, on motion, the Secretary was authorized to notify all delinquents of a year's duration that they would cease to continue as members if their dues were not paid prior to the next regular meeting.

The 32d regular meeting was held on June the 12th, Mr. Frost, of Vallejo, in the absence of the President, in the chair. After the usual routine of business, and the report of the Board of Directors relative to some local matters of the Society, the Board of Examiners, through their Secretary, Mr. Steele, reported that the Board had qualified before the City Clerk, and were now constituted State officers; that there had been 125 registrations in accordance with the provisions of the new law, and 23 applications not yet passed upon; that, further, the Board had concluded to extend the time of registration for ten days, and that all moneys received, after the incidental expenses of the Board were defrayed, would go into the funds of the California Pharmaceutical Society. The Board of Directors also gave notice that at the next regular meeting of the Society a resolution would be introduced creating a College Committee, with power to transact business pertaining to the establishment of a College of Pharmacy.

Wm. T. Wenzell, *Cor. Secretary.*

The Chemists and Druggists' Improvement Society, London, Ontario, was formed in September, 1871, and held its first examination, at the Mechanics' Institute, on May 6th. On May 8th a general meeting was held, at which the following officers were elected: Dr. F. H. Mitchell, President; H. Rosser, Vice-President; F. J. Osborne, Treasurer, and J. Williams, Secretary. During the summer semi-monthly meetings will be held for the study of botany, and from the first of October the meetings will be weekly for the study of materia medica and chemistry.

The Pharmaceutical Association of the Province of Quebec held its second annual meeting on May 23d, in the Laval University, at Quebec, the President, Mr. Nathan Mercer, in the chair. In his opening address the President discussed the origin, growth, aims and future prospects of the Association; springing from the Montreal Chemists' Association, a charter of incorporation by Parliament for the Provincial Association was granted; but a transfer of the examining power from the College of Physicians and Surgeons

to their Board had not been obtained; endeavoring to elevate the profession and protect the public by a higher standard of education, the Association can increase its usefulness when invested with the necessary authority.

The minutes of the last annual meeting were read and confirmed, which was followed by the reading of the annual report of the Council and of the Treasurer's report. After the election of new members, and passing votes of thanks to the retiring officers and the Rector of the University, the following gentlemen were elected members of the Council for the ensuing year: John Kerry, H. R. Gray, Alex. Manson, Jas. Goulden, H. Lyman, J. D. L. Ambrosse, A. Picault, C. L. Covernton, N. Mercer, E. Muir, E. Giroux, W. E. Brunet.

The British Pharmaceutical Conference will hold its annual meeting, at Brighton, on Tuesday, August 13th, at 10 o'clock A.M.

German Apothecaries' Society.—The time of the meeting of the North and South German Societies has been fixed for September 3d, 4th and 5th. The meeting, at which the two societies will be merged into one national society, will be held at Frankfort-on-the-Main, simultaneously with the meeting of the American Pharmaceutical Association, convening at Cleveland, Ohio.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The Twentieth Annual Meeting of the "American Pharmaceutical Association" will be held in the city of Cleveland, on the first Tuesday (3d) of September, 1872, commencing at 3 o'clock P.M.

It is confidently expected that the hopes expressed at the last meeting will be fully verified, and a large number of applications for membership presented to the Association at this meeting.

The Local Secretary, Henry C. Gaylord, of Cleveland, will receive the goods intended for exhibition during the session, and druggists as well as manufacturers of chemicals and articles connected with pharmacy and its collateral branches are respectfully requested to send the goods to be exhibited free of charge, and accompanied by an invoice and a full description of the articles.

Enno Sander, *President*,

St. Louis, June 24th, 1872.

Editorial Department.

The Next Meeting of the American Pharmaceutical Association.—Before our next issue will reach most of our readers, the members of the above Association will be on their journey to Cleveland to attend the twentieth annual meeting, which, it is expected, will be equal in interest and importance to the preceding ones. Many of the members from the Atlantic States will prob-

ably go there by way of Niagara Falls, where it has been proposed to spe Sunday, September 1st. Full delegations are expected from the different colleges and local societies, and several new organizations will most likely be represented.

The headquarters of the Association during the meeting will be at the Kennard House, where ample accommodations and a reduction from the regular charges have been provided.

Blank forms of application for membership may be obtained from the permanent or local secretary, the officers of the Association and from the members of the Executive Committee; all applications should, if possible, reach the proper officers previous to the meeting.

Unreliable Elixirs.—Mr. Scheffer's interesting paper, published on page 346 of the present number, shows conclusively how unreliable some of these preparations are. To use pepsin in a mixture is no proof that this delicate agent retains its virtues unaltered—an important lesson to the pharmacist, but of greater importance even to the physician.

How reliable the numerous other elixirs are, with which the market is flooded by manufacturers in all parts of the country, we are unable to say; but of some, at least, we entertain well founded doubts regarding their pretended composition and efficacy, which not unfrequently may be due to the stimulating effects of the aromatics and alcohol, of which they are made up.

The subject, it appears to us, is receiving by far too little attention on the part of the medical and pharmaceutical professions. Physicians are apt to place their reliance—as Mr. Scheffer correctly remarks—in the firm by whom the preparation is made, and in the name by which it is designated, while pharmacists frequently submit too readily to the clamor for pleasant medicines, without endeavoring to disabuse the physician's mind in regard to the pretensions of many of these quasi nostrums. The Newark Pharmaceutical Association and the Maryland and Louisville Colleges of Pharmacy, have taken a decided position towards this class of proprietary medicines, and if the American Pharmaceutical Association, at the approaching meeting, would act in the matter in a manner similar to that suggested last year by Mr. E. Walton Russel,* the benefit conferred thereby upon two kindred professions and upon the sick would be incalculable. The end in view would certainly justify the labor necessary to accomplish it.

Pulvis Glycyrrhizæ compositus has been recommended by the "Practitioner" as a mild and efficient aperient, and the formula, taken from the sixth edition of the Prussian pharmacopœia has been republished in many medical journals in this country. On page 292 of our last number we have given the formula as contained in the seventh edition of the pharmacopœia named, and, through a strange oversight, said that it differed from the former; the two formulas, however are identical, and differ merely in the quantities, which in the one are given in *definite weights* (ounces), and in the other in *parts by weight*.

*See American Journal of Pharmacy, , 1871, p. 381.

The Indiscriminate Sale of Poisons is justly criticised in an editorial of the Atlanta Medical and Surgical Journal for June. The legal regulations of the traffic in these articles are sufficiently stringent in many States to be regarded as salutary safeguards; and wherever such restrictions have not been enacted, the reputable pharmacist, of his own accord, adopts suitable provisions to guard against criminal negligence or design. He who omits those precautions which direct the attention of the purchaser or the patient to the dangerous qualities of poisonous articles, does not fulfill conscientiously the duties incumbent upon the pharmacist. We agree with the Atlanta Jonrnal that "it will have a salutary effect, if, instead of making the blame of general application, coroners' juries fix the culpability on the offending druggist in particular." The offence of an individual is not chargeable to an entire class of persons who follow their chosen calling, fully impressed with the weighty responsibility attached thereto.

The Atlanta Journal, however, is not disposed to censure pharmacists alone for the carelessness with which poisons are sold by some; it very justly remarks:

"But the apothecaries must not be made to take all the blame in this matter. Physicians are not altogether above reproach, and much of the looseness of poison-dispensing is fairly chargeable to them. It is the frequent habit with many practitioners, especially in their visits to families with whom they enjoy a certain degree of professional intimacy, to speak of drugs and to order them with a heedless freedom which deprives the poisonous articles of their deleterious character in the minds of the consumers. Especially is this the case with the preparations of opium. If a child is in pain, the general direction 'to give it five or ten drops of paregoric' is deemed enough without a prescription. If an opiate fomentation is required, the advice is to 'get a couple of ounces of laudanum at the druggist's' for the purpose. This heedlessness is easily acquired, but it is none the less blameworthy. It reacts on those who use the drugs, to throw them off their guard; and on those who sell them, to give them a ready excuse for similar heedlessness in dispensing. At best, physicians' prescriptions are, as a rule, sufficiently loose in their construction, and a regular course of practical instruction in this subordinate but important department of the medical art would be an acceptable innovation. But, meantime, for those to whom the medicamenta are familiar therapeutic instruments, in their daily practical duty, the lesson cannot be learned too soon, that the written prescription, even kept in duplicate, is not labor lost, no matter how trivial the order; that every such prescription is a voucher for the physician, for the patient and for the druggist; and that it is the pledge of accuracy which may greatly aid to correct the evils of indiscriminate dispensing."

Censurable as some physicians are in this respect, some have acquired another habit, which is at least equally fraught with danger; we refer to the entire absence of all directions upon some prescriptions. It is obvious that the most serious results may follow the mistaking of one medicine for another when both are merely labelled: "Use as directed." We know of an instance even where a physician regarded himself grievously offended, because a pharmacist had labelled a vial, "For external use only," which contained 20 grains nitrate of silver in 1 ounce of water, prescribed by the doctor without any directions whatever.

We are far from attributing the shortcomings of some physicians to the medical profession in general, and we know that on inquiry it will be found that

not everywhere "the adjacent apothecary is (or can be) selected to provide the sure and speedy poison."

Soda Water—What is it?—For the benefit of our readers who make, sell or drink soda water, we clip the following from the "Winedealers' Gazette," San Francisco, of April last; the information, we suppose, is strictly reliable, because the editor says that he is somewhat of a chemist himself, although we fancy that his chemical views have very little prospect of being adopted by English and German chemists and European pharmacologists, or by those of the new world either.

"We are satisfied they have imported the machinery for the new English process in manufacturing Sodas, wherein the base is *Carbonate of Potass*. The new process consists in part of passing carbonic acid gas through a solution of *sub carbonate*, and evaporating at a temperature of 212° to crystallization. This new process is indorsed by English and German chemists and European pharmacologists, as a 'wholesome effervescing draught.' The base of the old style Soda was *Sulphate of Potass* or *Salt of Tartar*.

We have long known the deleterious effects of many of our so-called Soda Waters. Some are made in the old style, even out of Bi-sulphate of Potass, which is nothing more than a high character of Nitric Acid."

The Forty-first Annual Exhibition of the American Institute will be held in New York, from September 4th to November 13th. The importance of these periodical exhibitions of new inventions and improved manufactures, and their value to both the producer and consumer, are well understood. With the increased accommodations, the approaching fair will, in point of interest, be fully equal if not superior to those which preceded it. The Secretary of the American Institute is Mr. John W. Chambers.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Archives of Ophthalmology and Otology. Edited and published simultaneously in English and German. By Prof. H. Knapp, M.D., in New York, and Prof. S. Moos, M.D., in Heidelberg. Vol. II, No. 2. New York: William Wood & Co. Carlsruhe: Chr. Fr. Muller'sche Hofbuchhandlung, 1872. 8vo, 316 pages.

This number of the Archives is fully equal to the preceding ones in elegance of dress and in the number of interesting and important essays, several of which are illustrated by well executed wood-cuts and by excellent lithographs, two of which are handsomely printed in colors. All the papers are original; about one-third of them are by American authors, the remainder written in Germany and translated here for this work. The importance of the specialities to which the Archives are devoted, and the subjects discussed by writers of note, render this periodical very valuable to the practitioner.

OBITUARY.

Dr. G. F. Reuter, director of the botanical garden and of the botanical conservatory at Geneva, died on the 23d of May.

Robert Wight, M. D., F. R. S., F. L. S., etc.—Science has lost one of her best workers, and Indian Botany one of its brightest ornaments, through the death which we record. Dr. Wight died at Grazeley Lodge, Reading, on the 26th of May, aged 76.

Dr. Wight was born at Milton, Duncra Hill, East Lothian, on July 6th, 1796, and took his degree at Edinburgh, in 1816. Soon afterwards he entered the East India Company's service, serving first as Assistant Surgeon, and subsequently as full Surgeon in the 33d Regiment of Foot. During this time, travelling from place to place, and throughout his long life in India, he devoted extraordinary talent and energy to the collection, description and illustration of Indian plants. In 1834, whilst staying in Edinburgh on furlough, he published, in conjunction with Professor Arnott, of that city, the first and only volume of "Prodromus Floræ Peninsulæ Orientalis" (1834), a work that has been spoken of as "the most able and valuable contribution to Indian Botany which has ever appeared." Dr. Wight's return to India, however, did not allow of the completion of the work.

The success of this publication had the effect of stimulating Dr. Wight to further exertions, and, on his return to Madras, he commenced a very valuable work, entitled "Illustrations of Indian Botany," two volumes of which were published, containing 182 colored plates of various Indian plants. This work was followed by a still larger one, entitled "Icones Plantarum Indiæ Orientalis," which consisted of valuable descriptions, illustrated with 2101 uncolored plates. After this appeared a third illustrated work on the flora of the Neilgherries, entitled "Spicilegium Neilgherrense." The illustrations of all these works are very good; and one cannot but be impressed with the indomitable perseverance shown by Dr. Wight in the success and fidelity of their production at the time when lithography was in a very rude state in India.

Besides these large publications, a great number of memoirs by Dr. Wight are to be found in various botanical journals. Very many valuable medicinal and other useful plants have been figured and described by him. We need only mention as illustrations: *Tylophora asthmatica*, *Argemone mexicana*, *Calysaccion longifolium*, *Mesua ferrea*, *Vateria indica*, *Ailanthus excelsa*, *Rhus succedanea*, *Moringa pterygosperma*, etc.

Dr. Wight paid great attention, not only to the developing of Indian products, but also to the introduction of other articles, such as tea, cinchona and cotton. He was for a long time superintendent of the cotton plantations at Coimbator, and published various memoirs on the subject of cotton. Dr. Wight retired finally from India in 1853, and, since that period, has been working at the Indian Flora as much as his health would allow; and by his notes and materials largely assisting others working in the same field. Dr. Wight was married in 1838, and leaves a widow, four sons and a daughter. In presence of so much work accomplished, as shown in this slight sketch of one of the ablest Indian botanists that ever lived, and remembering the labors of Roxburgh, Griffith, Royle and others, one is tempted to use the phrase, "There were giants in those days."—*Pharm. Journ. and Trans., June* 22, 1872.